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National Mapping Program Technical Instructions

Part 1
General

Standards for Revised Primary Series Quadrangle Maps

U.S. Department of the Interior
U.S. Geological Survey

CONTENTS

LIST OF PAGES

A complete and current copy of Part 1 of the Standards for Revised Primary Series Quadrangle Maps consists of the pages (and most recent creation or revision dates) listed below.

1. GENERAL

This part of the standard provides a general description of revised primary series quadrangle maps. The main focus is on basic revision maps, although descriptions of the characteristics of complete revision maps have also been included.

Several terms used in this standard are defined in appendix 1-A.

1.1 STANDARD SERIES MAPS

In this section, the term "standard series maps" refers to previously published primary series quadrangle maps that were prepared using symbology from the Standards for 1:24,000- and 1:25,000-Scale Quadrangle Maps, Parts 5 and 6.

1.1.1 Categories of Revision

Choosing the revision type to perform is based on NMD programmatic commitments, user requirements, available resources, and cooperator choice for cooperatively funded quadrangles. Activities such as initial accuracy assessments and evaluations of existing quadrangle materials and deficiencies reported through map correction files support this determination.

1.1.1.1 Minor Revision

Minor revision maps contain updated collar information and some revised interior information; primarily names and boundaries. See Supplemental Technical Instruction (STI) 98-3 for a complete description of minor revision procedures.

1.1.1.2 Basic Revision

Basic revision is performed when there is a critical time requirement or resource limitation that precludes complete revision. A subset of the existing feature content is revised. The map content is not field checked. The revised map maintains the positional accuracy of the previously published map. If the previously published map does not meet current accuracy standards, the overall accuracy of the map does not have to be improved during basic revision. However, the position of previously mapped, moved, or new features must adhere to the feature positioning guidelines in section 1.1.8.

1.1.1.3 Complete Revision

Complete revision is a comprehensive revision and validation of all standard feature content, including contours. All new information is field checked or verified against reliable ancillary sources. Complete revision maps must meet current accuracy standards for

horizontal and vertical accuracy.

1.1.2 Names

All new and changed names must be checked against approved Geographic Names Information System (GNIS) sources and submitted to GNIS through the Geographic Names Office (GNO) before the map materials are sent to be printed. The GNO submits the names to the Board on Geographic Names (BGN), if necessary. The BGN must be notified of all recommended name changes or additions to the GNIS content, including those that are not under the purview of the BGN, before the map is printed. If a BGN decision dictates a change and the map has already been printed, record the change and decision in the correction file.

See also section 2F.1.2 Controversial Names and Name Changes.

Basic Revision

Retain all names and labels that were previously on the source map if the features to which the names and labels apply are shown on the new map. Do not individually verify names against the GNIS data base unless there is evidence of a possible conflict with an approved GNIS source. Change names if there is a record of a BGN decision in the GNIS and if the feature to which the name applies is shown. Also, change any name that has been identified as an error in the correction files, if supported by the GNIS or BGN. There is no requirement to add any new names or labels, except for those that are identified during boundary revision. However, other new names and labels may be added.

Complete Revision

Review and verify all names that were on the previously published map against correction files, boundary plats, and other available ancillary sources. Change any name that has been identified as an error on these sources, if supported by the GNIS. Any other name conflicts should be resolved in the field, if possible.

1.1.3 Projection

In general, all revised primary series maps should be cast on the Universal Transverse Mercator projection, except for joint USGS and USDA Forest Service single edition maps or other maps produced under a mutual agreement. Single edition maps produced by the USDA Forest Service are cast on the appropriate State Plane projection. See section 2.3.23.7 for more specific information on the projections used on single edition maps.

A maximum difference of ≤ 0.007 inch (14 feet at 1:24,000 scale) between the length of the projection lines on the map and the length of the computed projection lines is acceptable on revised maps.

1.1.4 Map Scale

In general, the map scale of the previous edition should be retained during revision. Possible exceptions include maps prepared by cooperative agreement, converted provisional maps and orthophotomaps, and reformatted maps that were originally prepared as 7.5- x 15-minute quadrangles (see also section 1.2 Other Maps). Decisions regarding the adjustment of the map scale from 1:25,000 to 1:24,000 are based on funding, cooperator choice, and mapping center recommendations.

1.1.5 Datums

1.1.5.1 Horizontal Datum

Convert all maps that were previously on the North American Datum of 1927 (NAD 27) to the North American Datum of 1983 (NAD 83), except for joint USGS and USDA Forest Service single edition maps. Single edition maps produced by the USDA Forest Service are retained on NAD 27. Hawaii, the Alaskan islands of St. Lawrence, St. Matthew, St. Paul, and St. George, and the U.S. outlying areas of American Samoa, Guam, and Puerto Rico were originally mapped on their own horizontal datum. Revised maps of these areas should also be converted to NAD 83.

Fill the voids on map edges created by datum shifts by extracting

the missing features from the adjoining maps. If possible, resolve all gaps and mismatches in content and position between previously mapped features and added features.

1.1.5.2 Vertical Datum

Maintain all quadrangles on the vertical datum that was used on the previously published map. See section 2.3.13.3 for the appropriate use of the North American Vertical Datum of 1988 conversion note.

1.1.6 Reference Systems

1.1.6.1 Universal Transverse Mercator Grid

Show the full-line Universal Transverse Mercator (UTM) grid on all revised maps, except for single edition maps. Show UTM grid ticks on single edition maps.

1.1.6.2 State Plane Coordinate System

Show State Plane Coordinate System grid ticks for the appropriate horizontal datum on all revised maps.

1.1.7 Content

The Standards for 1:24,000-Scale Digital Line Graphs and Quadrangle Maps defines feature types and provides the criteria used to determine if a feature instance should be captured.[1] There is no longer a requirement to use the same set of revision criteria for map revision and digital line graph (DLG) revision.[2] All features that are added or modified during map revision must meet the definition and capture conditions for that feature.

The content guidelines for revised primary series maps are noted below.

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[1] For single edition maps, see Standards for USGS and USDA Forest Service Single Edition Quadrangle Maps (in preparation).

[2] Current revision content guidelines for DLG's differ from map revision content guidelines. If basic revision maps are prepared from DLG's, features that were deleted during digital limited update do not have to be restored, except as indicated in this standard (see appendix 2-A).

Basic Revision

A subset of previously published features is revised during basic revision (see appendix 2-A). Basic revision feature content is restricted to the following:

- Feature instances that are photoidentifiable on a monoscopic source, supplemented with available stereoscopic and ancillary sources, and

- Features shown on previously published maps, unless they positively no longer exist, and

- Features, such as boundary lines, that are not photoidentifiable but can be plotted from reliable available ancillary sources.

It is not necessary to check to see if previously published existing features meet current capture conditions during basic revision. However, all modified features must meet current capture conditions.

For instance, the minimum size of lakes represented on maps has changed over the years. Lakes that were shown on previous editions of maps are retained if they still exist and the shorelines have not undergone obvious changes. If there has been an obvious change, the resulting lake is subject to the same current size requirements and capture conditions that are applied to new features.

Complete Revision

All map content (including contours) is validated or revised on the basis of current definitions and capture conditions. All new information is field checked or verified against reliable ancillary sources.

1.1.8 Feature Positioning

Do not adjust the position of previously mapped features (including those shown in purple) during revision if they meet the following criteria:

- They are within the delineation tolerance of source position as defined for revision mapping. (The terms "source position" and "delineation tolerance" are defined in appendix 1-A). The tolerance for map features is ± 0.036 inch (73 feet at 1:24,000 scale) of their location on the source imagery (refer to appendix 1-B for the reasons for having a delineation tolerance on revised maps); and

- They adequately represent the shape of the actual feature and the feature's connectivity with and position relative to other features; and

- They do not conflict with existing, modified, or new features when all features are fully symbolized on the graphic.

Delete, move, or recollect previously mapped features if they do not meet these criteria.

Compile new and moved features to within ± 0.007 inch (14 feet at 1:24,000 scale) of the source position unless there is a conflict with existing features. In most cases, if there is a conflict with an existing feature, the feature of lesser priority[3] should be displaced so that the conditions above are met.

Displace features as necessary to conform to graphic symbolization, generalization, and conflict resolution specifications.

1.1.9 Edge Matching

Except where identified as unique to basic revision maps, all of the following edge matching guidelines apply to both basic and complete

[3] In general, the priority of features is as follows, beginning with the higher priority features: railroads, roads, miscellaneous cultural features, and hydrography. New and moved features can be displaced from the source position, regardless of the hierarchy, if this will help to avoid a cascade of changes and the position criteria for existing features is met.

revision maps.

Match all map edges internally within a project area. Correct mismatches to ensure that feature information internal to the project is continuous in content and position. This includes pre-existing mismatches incorporated into the map when a quadrangle is converted from NAD 27 to NAD 83. The following mismatches are not corrected:

- Mismatches at the edge of a project area that occur because the content varies on adjoining maps with different source dates.

- In basic revision, those hypsography mismatches that cannot be resolved by logical contouring (see section 2.2.6 Hypsography).

- Mismatches that occur on bathymetric quadrangles matched to non-bathymetric quadrangles in areas where no bathymetric data exist. The rest of the data on these quadrangles are edge matched according to the guidelines above.

Where feasible, match all map edges external to a project area. The practicality of joining to older maps depends on the accuracy, completeness, status, and currentness of these maps. Mismatches that cannot be resolved with available sources do not have to be further investigated or corrected.

1.1.10 Image Sources

The primary sources used to revise quadrangle maps are digital orthophotoquads, aerial photographs, satellite imagery, or other image products. For revision, the vintage of these primary image sources must be no older than 6 years from the date of completion and no more than 3 years from the date of authorization. This will ensure that the content of the revised map is based on relatively current sources.

1.2 OTHER MAPS

In this section, the term "other maps" refers to previously published primary series quadrangle maps that were not prepared with Part 5 or Part 6 symbols or that were formatted as 7.5- x 15-minute quadrangles.

In general, revisions of these maps have the same characteristics as revised standard series maps (see section 1.1 Standard Series Maps). Exceptions are noted below.

1.2.1 Provisional Maps

Provisional maps (P-maps) were prepared using unconventional symbology reproduced, for the most part, from original map manuscripts. Many feature labels were hand scribed in an effort to reduce production time and cost. P-maps were prepared at either 1:24,000 scale with foot contour intervals or 1:25,000 scale with metric contour intervals. The goal is to gradually convert P-maps to finished line maps through revision, although some have already been revised using purple symbology. Decisions regarding revision production methods, the conversion to finished line maps, the adjustment of the scale from 1:25,000 to 1:24,000, the changing of a metric contour interval to a customary foot contour interval, and the selection of a revision symbol set are based on funding, cooperator choice, and mapping center recommendations.

If P-maps are converted to finished line maps, features shown on the previous edition that obviously do not meet capture conditions should not be shown. However, an intensive check to see if previously shown features meet current capture conditions is not required. For instance, it may be necessary to thin out the spot elevations (see section 2F.3.6.2 Spot Elevations) and drainage (see section 2.2.1 Hydrography) shown on the previous edition of the map. Extra elevations and drains were often compiled during the production of P-maps to help shape contours properly.

1.2.2 7.5- x 15-Minute Series Maps

To honor original cooperative agreements, the USGS should contact

the appropriate State agency before maps previously published as 7.5- x 15-minute series quadrangles are revised.

Except for joint USGS and USDA Forest Service single edition maps, 7.5- x 15-minute maps are converted to the 7.5- x 7.5-minute format only if the State cooperator expresses a desire to have the maps reformatted and cooperative funding is available. Alternative production methods are then evaluated to determine the most efficient method.

The default format for single edition maps produced by the USDA Forest Service is 7.5- x 7.5-minutes unless a cooperator expresses a desire to retain the 7.5- x 15-minute format.

See section 2.3.6 Sources Notes for notes to use when 7.5- x 15-minute and 7.5-minute maps are maintained over the same area.

See section 2.3.22 for information on the placement of the recycle logo on 7.5- x 15-minute quadrangles.

1.2.3 Orthophotomaps

Orthophotomaps combine orthoimagery and cartographic finished line map symbols.

Revised orthophotomaps should always be converted to finished line maps with standard symbols. Do not show the orthoimage on the revised map. The interior type can either be retained and matched or replaced with current standard type styles. Use whichever method is the most economically practical. See section 2.1 Map Editing Guidelines for more guidance on which approach to use.

APPENDIX 1-A

Definitions

BASIC REVISION = The map revision procedure performed when there is a critical time requirement or resource limitation that precludes complete revision. A subset of the existing feature content is revised and the map content is not field checked. The revised map maintains the overall positional accuracy of the previously published map.

CARTOGRAPHIC CONTENT = The representation of only those content-worthy features that can be symbolized, taking into account the space and legibility constraints of the map.

CARTOGRAPHIC GENERALIZATIONS = Methods of limiting the amount of information symbolized on a map, taking into consideration space and legibility issues. Methods include simplification, exaggeration, and selection/elimination.

CARTOGRAPHIC POSITION = The position of a feature after it has been displaced or modified to permit legible symbolization on a map. Example: The displacement of a linear feature that closely parallels another feature to allow for symbol separation.

COMPLETE REVISION = The comprehensive map revision procedure that consists of correcting, maintaining, and validating all feature content, including contours. New information is field checked, and the revised map meets all National Mapping Division (NMD) standards for feature content and current accuracy standards for horizontal and vertical accuracy.

CONTENT-WORTHY FEATURES = The feature content specified for collection in product standards. Feature content beyond that specified in product standards may be obtainable from a digital orthophotoquad or other sources, but the additional features are not content worthy. The fact that a feature is collectible from a source does not in and of itself justify its capture.

DELINEATION TOLERANCE = An allowable threshold of source position accuracy for previously mapped existing features. The positions of previously mapped existing features that do not exceed the delineation tolerance are not modified or adjusted during revision mapping.

DLG REVISION = Revision of digital vector data.

FEATURE INSTANCE = An occurrence in a data set of a feature type defined by a unique set of characteristics. For example, the Roosevelt Bridge is a particular instance of the feature type BRIDGE.

FEATURE TYPE = A class of entities defined by common characteristics. BRIDGE is an example of a feature type.

GEOGRAPHIC CONTENT = The representation of content-worthy features with no generalizations for map symbolization.

GEOGRAPHIC POSITION = The position of features as they exist on the ground, as best approximated by high-accuracy sources or geodetic surveys.

RASTER GRAPHIC REVISION = A map revision process that uses raster images of scanned maps as a primary source.

REVISION = The modification of map content to reflect changes that have occurred since the date of the previously published map.

SOURCE POSITION = The position of features as they exist on source materials, such as digital orthophotoquads.

TRUE POSITION = The "exact" position of features as they exist on the ground.

APPENDIX 1-B

Delineation Tolerance for Revision

When previously mapped existing features are compared with newer imagery, mapped positions may not match corresponding source positions. The delineation tolerance provides a threshold for accepting or correcting these positional discrepancies. There are several reasons for having a delineation tolerance for revision mapping:

(1) The intent for revision mapping is not necessarily to improve small positional discrepancies, some of which may occur from cartographic symbol displacement.

(2) The tolerance discourages inappropriate attempts to improve perceived positional inaccuracies that may be present due to the overall error budget of source materials, map control solutions, and previous production processes. Correcting inherent systematic errors during revision does not necessarily improve overall positional accuracy. In future revisions, image sources may have different control solutions that could negate small positional adjustments made during current projects.

(3) The delineation tolerance promotes optimum production time and efficiencies for map revision.

Maps having a large number of previously mapped existing features located between source position and the delineation tolerance may fail current accuracy standards. However, the delineation tolerance supports the intent and goal for revision, whether or not the revised map meets current accuracy standards.

The delineation tolerance is not used to define the overall positional accuracy of a graphic map. Also, the delineation tolerance is not used for applying the accuracy statement. Overall positional accuracy and the application of the accuracy statement are verified through accuracy testing procedures.